



Buckstones Community Primary School

Policy for Mathematics

Written and agreed by staff: Monday 13th. May 2013

Adopted by Governors: Tuesday 17th. September

Signed by Chair:

THE NATURE OF MATHEMATICS

Aims

The aim of the policy is to ensure that all our children leave school as numerate individuals equipped with the skills and concepts to be successful both in their education and in everyday life itself.

Mathematics is a tool for everyday life. It is a whole network of concepts and relationships which provide a way of viewing and making sense of the world. It is used to analyse and communicate information and ideas and to tackle a range of practical tasks and real life problems. It also provides the materials and means for creating new imaginative worlds to explore.

Using the Programmes of Study from the National Curriculum and the National Numeracy Strategy Framework for Teaching Mathematics it is our aim to develop:

- √ a positive attitude towards mathematics and an awareness of the fascination of mathematics
- √ competence and confidence in mathematical knowledge, concepts and skills
- √ an ability to solve problems, to reason, to think logically and to work systematically and accurately.
- √ initiative and an ability to work both independently and in cooperation with others
- √ an ability to communicate mathematics
- √ an ability to use and apply mathematics across the curriculum and in real life
- √ an understanding of mathematics through a process of enquiry and experiment

SCHOOL POLICY AND THE NATIONAL CURRICULUM

Knowledge Skills and Understanding

At KS1 and KS2 teachers use the NNS Framework for Teaching Mathematics to ensure that all parts of the National Curriculum Programme of Study are taught.

This aims to implement the statutory requirements for teaching mathematics in primary schools. Teachers utilise a range of resources and differentiation to meet the preferred learning needs and styles of the children in their classes. We use Big Maths Lessons where the class work together on more open ended aspects of the subject in order to enrich the curriculum. We also use Ben Harding's Big Maths to reinforce key concepts and basic skills.

Breadth of Study

Opportunities are offered to children to develop their mathematical knowledge and skills through tackling problems and through purely mathematical activities e.g. Buckstones' Big Maths.

These activities are balanced between those which are short in duration and those which can be developed over a longer period.

Children are given opportunities to be involved in both individual and group work, experience open-ended as well as closed tasks.

They are encouraged to develop a range of methods of calculation, e.g. mental, pencil and paper procedures and using a calculator.

Children develop skills using a wide range of mathematical tools through practical work (including computers).

Children are enabled to develop their personal qualities and a positive attitude to mathematics through the experiences offered to them.

SCHEME OF WORK

Our school scheme of work is a working document and as such is composed of ongoing plans produced on a week by week basis. This is developed from the NNS Framework and takes into consideration the needs of our children.

CROSS-CURRICULAR ISSUES

Throughout the whole curriculum opportunities exist to extend and promote mathematics. Teachers seek to take advantage of all opportunities. Mathematics also underpins learning in virtually every other subject in the curriculum. Where possibilities exist, links are made to and from other subjects in teachers' planning and delivery. In each classroom, there is a display showing how mathematics links with other subjects across the curriculum.

TEACHERS' PLANNING AND ORGANISATION

The school uses a variety of teaching and learning skills in Mathematics lessons in order to meet the needs and learning styles of all children. At the heart of this is an emphasis on practical experiences as well as mathematical skills, developing the feel for number as well as a knowledge base and increasing confidence to make use of mathematics both in problem solving and in other areas in life.

Teachers of the Reception class base their teaching on objectives in the Framework for Reception; this ensures that they are working towards the 'Early Learning Goals for Mathematical Development'. Towards the end of Reception teachers aim to draw the elements of a mathematics lesson together so that the children are prepared for the move into Year 1.

INCLUSION

Where a child's needs are significantly different from their peers, the teacher will liaise with parents and the Inclusion Coordinator to determine how best to meet the child's requirements. If the needs are very specific the children will have individual targets to meet their needs.

Some children may not have such specific needs and where this is the case, teachers in the first instance, differentiate work accordingly. There are booster groups in each class for those children who are not on target. Certain children in Year 6 also benefit from the use of the One to One project to help them attain their targets.

For those children who are identified as gifted in Mathematics work is differentiated to enable them to enhance their learning and achieve their goals. Outside opportunities for these children to participate with equally gifted children are also promoted.

When additional support staff are available to support groups or individual children they work collaboratively with the class teacher.

Within mathematics lessons teachers not only provide activities to support children who find mathematics difficult but also activities that provide appropriate challenges for children who are high achievers in mathematics.

EQUAL OPPORTUNITIES

In line with our Equal Opportunities Policy we are committed to providing a teaching environment conducive to learning. Each child is valued, respected and challenged regardless of race, gender, religion, social background, culture or disability.

Mathematics forms part of the school curriculum policy to provide a broad and balanced education to all children. Through our Mathematics teaching we provide learning opportunities that enable all pupils to make progress.

PUPILS' RECORDS OF THEIR WORK

Children are encouraged to discuss their Mathematics and then to record and communicate their Mathematics in a variety of ways e.g. in books, on whiteboards, CLIC files, orally, photographs of practical activities, ICT.

All children are encouraged to work tidily and neatly when recording their work. When using squares one square should be used for each digit.

ASSESSMENT AND RECORD KEEPING

Children are assessed regularly in class in both formal and informal settings as part of daily classroom life.

In the foundation stage, Baseline assessment is carried out on entry to Reception Class. Progress is then mapped using the Foundation Stage Profile.

On a more formal basis, our Year 6 children are assessed in May using the National Key Stage 2 Standard Assessment Tests (SATs). In Year 2 the children are formally assessed and levels reported for national usage. Other classes use the Assessing Pupils Progress (APP) methodologies.

APP (Assessing Pupil Progress) is carried out and is based on evidence and observations from children's independent learning in a range of activities. As such this evidence is recorded for groups of children to assess progress, make a judgement about levels of attainment and inform future target setting.

All these assessments are collated to make a final judgement about pupil progress at the end of the academic year which is then reported on to parents and passed to the next school year group.

MONITORING AND EVALUATION

The teaching and learning of Mathematics is monitored and evaluated regularly.

The role of the Mathematics co-ordinator is to:

1. Support colleagues in teaching the subject content in each unit.
2. Renew, update and complement resources needed to deliver the curriculum, within budget restraints.
3. Audit planning and current practice.
4. Develop assessment and record keeping to ensure progression and continuity.
5. Keep up-to-date with developments in Mathematics education.
6. To liaise with the Numeracy Governor about the impact of the policy.

PROGRAMME OF STUDY

Reception

<p style="text-align: center;"><u>Number Early Learning Goal</u></p> <p>Children count reliably with numbers from one to 20, place them in order and say which number is one more or one less than a given number. Using quantities and objects, they add and subtract two single-digit numbers and count on or back to find the answer. They solve problems, including doubling, halving and sharing.</p>	<p style="text-align: center;"><u>Shape, space and measure Early Learning Goal</u></p> <p>Children use everyday language to talk about size, weight, capacity, position, distance, time and money to compare quantities and objects and to solve problems. They recognise, create and describe patterns. They explore characteristics of everyday objects and shapes and use mathematical language to describe them.</p>
--	--

Year 1 programme of study (statutory requirements)	Notes and Guidance (non-statutory)
<p>Number and place value Pupils should be taught to:</p> <ul style="list-style-type: none"> • count to and across 100, forwards and backwards, beginning with 0 or 1, or from any given number • count, read and write numbers to 100 in numerals, count in different multiples including ones, twos, fives and tens • given a number, identify one more and one less • identify and represent numbers using concrete objects and pictorial representations including the number line, and use the language of: equal to, more than, less than (fewer), most, least • read and write numbers from 1 to 20 in digits and words. 	<p>Number and place value Pupils should practise counting (1, 2, 3), ordering (e.g. first, second, third), or to indicate a quantity (e.g. 3 apples, 2 centimetres), including solving simple concrete problems, until they are fluent. They should practise counting as reciting numbers and counting as enumerating objects, and counting in ones, twos, fives and tens from different multiples to develop their recognition of patterns in the number system (e.g. odd and even numbers). They connect these patterns with objects and with shapes, including through varied and frequent practice of increasingly complex questions. Pupils begin to recognise place value in numbers beyond 20 by reading, writing, counting and comparing numbers up to 100, supported by concrete objects and pictorial representations.</p>
<p>Addition and subtraction Pupils should be taught to:</p> <ul style="list-style-type: none"> • read, write and interpret mathematical statements involving addition (+), subtraction (-) and equals (=) signs • represent and use number bonds and related subtraction <p>facts within 20</p> <ul style="list-style-type: none"> • add and subtract one-digit and two-digit numbers to 20 ($9 + 9$, $18 - 9$), including zero • solve simple one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems. 	<p>Addition and subtraction Pupils should memorise and reason with number bonds to 10 and 20 in several forms (e.g. $9 + 7 = 16$; $16 - 7 = 9$; $7 = 16 - 9$). They should realise the effect of adding or subtracting zero. Pupils should combine and increase numbers, counting forwards and backwards. They should discuss and solve problems in familiar practical contexts, including using quantities. Problems should include the terms put together, add, altogether, total, take away, difference between, more than and less than so that pupils develop the concept of addition and subtraction and are enabled to use these operations flexibly.</p>
<p>Fractions Pupils should be taught to:</p> <ul style="list-style-type: none"> • recognise, find and name a half as one of two equal parts of an object, shape or quantity • recognise, find and name a quarter as one of four equal parts of an object, shape or quantity. 	<p>Fractions Pupils should be taught $\frac{1}{2}$ and $\frac{1}{4}$ as operators on discrete and continuous quantities by solving problems using shapes, objects and quantities. For example, they could recognise and find half a length, quantity, set of objects or shape. Pupils connect halves and quarters to the equal sharing and grouping of sets of objects and to</p>

	measures, as well as recognising and combining halves and quarters as parts of a whole.
<p>Measures Pupils should be taught to:</p> <p>compare, describe and solve practical problems for:</p> <ul style="list-style-type: none"> lengths and heights (e.g. long/short, longer/shorter, tall/short, double/half) mass or weight (e.g. heavy/light, heavier than, lighter than) capacity/volume (full/empty, more than, less than, quarter) <p>time (quicker, slower, earlier, later)</p> <ul style="list-style-type: none"> measure and begin to record the following: lengths and heights mass/weight capacity and volume time (hours, minutes, seconds) <p>recognise and know the value of different denominations of coins and notes</p> <ul style="list-style-type: none"> sequence events in chronological order using language such as: before and after, next, first, today, yesterday, tomorrow, morning, afternoon and evening <p>recognise and use language relating to dates, including days of the week, weeks, months and years</p> <ul style="list-style-type: none"> tell the time to the hour and half past the hour and draw the hands on a clock face to show these times. 	<p>Measures The terms mass and weight, volume and capacity are used interchangeably at this stage Pupils should move from using and comparing different types of quantities and measures using non-standard units, including discrete (e.g. counting) and continuous (e.g. liquid) measures, to using manageable common standard units. They should understand the difference between non-standard and standard units.</p> <p>In order to become familiar with standard measures, pupils begin to use measuring tools such as a ruler, weighing scales and containers. Pupils should use the language of time, including telling the time throughout the day, first using o'clock and then half past.</p>
<p>Geometry: properties of shapes Pupils should be taught to:</p> <ul style="list-style-type: none"> recognise and name common 2-D and 3-D shapes, including: 2-D shapes (e.g. rectangles (including squares), circles and triangles) <p>3-D shapes (e.g. cuboids (including cubes), pyramids and spheres).</p> <p>Geometry: position, direction, motion Pupils should be taught to:</p>	<p>Geometry: properties of shapes Pupils should handle common 2-D and 3-D shapes, naming these and related everyday objects fluently. They should recognise these shapes in different orientations and sizes, and know that rectangles, triangles, cuboids and pyramids can be different shapes.</p> <p>Geometry: position, direction, motion Pupils should create, copy, describe and reorganise patterns. They should use the language of position, direction and motion, including: left and right,</p>

- order and arrange combinations of objects and shapes in patterns
- describe position, directions and movements, including half, quarter and three-quarter turns.

top, middle and bottom, on top of, in front of, above, between, around, near, close and far, up and down, forwards and backwards, inside and outside.

Pupils should make turns to show they understand half, quarter and three-quarter turns and routinely make these turns in a clockwise direction.

Year 2 programme of study (statutory requirements)	Notes and Guidance (non-statutory)
<p>Number and place value Pupils should be taught to:</p> <ul style="list-style-type: none"> • count in steps of 2, 3, and 5 from 0, and count in tens from any number, forward or backward • recognise the place value of each digit in a two-digit number (tens, ones) • identify, represent and estimate numbers using different representations, including the number line • compare and order numbers from 0 up to 100; use $<$, $>$ and $=$ signs • read and write numbers to at least 100 in numerals and in words • use place value and number facts to solve problems. 	<p>Number and place value Using materials and a range of representations, pupils should practise counting, reading, writing and comparing numbers to at least 100 and solving a variety of related problems to develop fluency. They should count in multiples of three to support their later understanding of a third. As they become more confident with numbers up to 100, pupils should be introduced to larger numbers to develop further their recognition of patterns within the number system and represent them in different ways, including spatial representations. Pupils should partition numbers in different ways (e.g. $23 = 20 + 3$ and $23 = 10 + 13$) to support subtraction. They become fluent and apply their knowledge of numbers to reason with, discuss and solve problems that emphasise the value of each digit in two-digit numbers. They begin to understand zero as a place holder.</p>
<p>Addition and subtraction Pupils should be taught to:</p> <ul style="list-style-type: none"> • solve simple one-step problems with addition and subtraction: • using concrete objects and pictorial representations, including those involving numbers, quantities and measures • applying their increasing knowledge of mental and written methods • recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100 • add and subtract numbers using concrete objects, pictorial representations, and mentally, including: <ul style="list-style-type: none"> • a two-digit number and ones • a two-digit number and tens • two two-digit numbers • adding three one-digit numbers • show that addition of two numbers can be done in any order (commutative) and subtraction of one number from another cannot 	<p>Addition and subtraction Pupils should extend their understanding of the language of addition and subtraction to include sum and difference. Pupils should practise addition and subtraction to 20 to become increasingly fluent in deriving facts such as using $3 + 7 = 10$, $10 - 7 = 3$ and $7 = 10 - 3$ to calculate $30 + 70 = 100$, $100 - 70 = 30$ and $70 = 100 - 30$. They should check their calculations, including by adding to check subtraction and adding numbers in a different order to check addition (e.g. $5 + 2 + 1 = 1 + 5 + 2 = 1 + 2 + 5$). Recording addition and subtraction in columns supports place value and prepares for efficient written methods with larger numbers.</p>

<ul style="list-style-type: none"> recognise and use the inverse relationship between addition and subtraction and use this to check calculations and missing number problems. 	
<p>Multiplication and division Pupils should be taught to:</p> <ul style="list-style-type: none"> recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (\times), division (\div) and equals (=) signs recognise and use the inverse relationship between multiplication and division in calculations show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot solve one-step problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts. 	<p>Multiplication and division Pupils should use a variety of language to describe multiplication and division. They are taught multiplication and division with larger numbers through equal grouping and sharing out quantities, relating multiplication tables to arrays and repeated addition and finding more complex fractions of objects, numbers and quantities. Pupils should be introduced to the multiplication tables. They should practise to become fluent in the 2, 5 and 10 multiplication tables and connect them to each other. They connect the 10 multiplication table to place value, and the 5 multiplication table to the divisions on the clock face. They begin to use other multiplication tables and recall multiplication facts, including using related division facts to perform written and mental calculations. Pupils should work with a range of materials and contexts in which multiplication and division relate to grouping and sharing discrete and continuous quantities, relating these to fractions and measures (e.g. $40 \div 2 = 20$, 20 is a half of 40). They use commutativity and inverse relations to develop multiplicative reasoning (e.g. $4 \times 5 = 20$ and $20 \div 5 = 4$).</p>
<p>Fractions Pupils should be taught to:</p> <ul style="list-style-type: none"> recognise, find, name and write fractions $\frac{1}{3}$, $\frac{1}{4}$, $\frac{2}{4}$ and $\frac{3}{4}$ of a length, shape, set of objects or quantity write simple fractions e.g. $\frac{1}{2}$ of 6 = 3 and recognise the equivalence of two quarters and one half. 	<p>Fractions Pupils should use additional fractions as operators on discrete and continuous quantities by solving problems using shapes, objects and quantities. They connect unit fractions to equal sharing and grouping, to numbers when they can be calculated, and to measures, finding fractions of lengths, quantity, a set of objects or shapes. They meet $\frac{3}{4}$ as the first example of a non-unit fraction. Pupils should count in fractions up to 10, starting from any number and using the $\frac{1}{2}$ and $\frac{2}{4}$ equivalence on the number line (e.g. $1\frac{1}{4}$, $1\frac{2}{4}$, (or $1\frac{1}{2}$), $1\frac{3}{4}$, 2). This reinforces the concept of fractions as numbers and that they can add up to more than one.</p>

<p>Measures Pupils should be taught to:</p> <ul style="list-style-type: none"> • choose and use appropriate standard units to estimate and measure length/height in any direction (m/cm); mass (kg/g); temperature (°C); capacity (litres/ml) to the nearest appropriate unit, using rulers, scales, thermometers and measuring vessels • compare and order lengths, mass, volume/capacity and record the results using >, < and = • read relevant scales to the nearest numbered unit • recognise and use symbols for pounds (£) and pence (p); combine amounts to make a particular value and match different combinations of coins to equal the same amounts of money; add and subtract money of the same unit, including giving change • solve simple problems in a practical context involving addition and subtraction of money • compare and sequence intervals of time • tell and write the time to five minutes, including quarter 	<p>Measures Pupils should use standard units of measurement with increasing accuracy, using their knowledge of the number system. They should use the appropriate language and record using standard abbreviations. They should become fluent in telling the time on analogue clocks and recording it. Pupils should also become fluent in counting and recognising coins. They should use the symbols £ and p accurately and say the amounts of money confidently.</p>
<p>Geometry: properties of shapes Pupils should be taught to:</p> <ul style="list-style-type: none"> • identify and describe the properties of 2-D shapes, including the number of sides and symmetry in a vertical line • identify and describe the properties of 3-D shapes, including the number of edges, vertices and faces • identify 2-D shapes on the surface of 3-D shapes, for example a circle on a cylinder and a triangle on a pyramid • compare and sort common 2-D and 3-D shapes and everyday objects. 	<p>Geometry: properties of shapes Pupils should handle and name a wider variety of common 2-D and 3-D shapes including: quadrilaterals and cuboids, prisms, cones and polygons, and identify the properties of each shape (e.g. number of sides, number of faces). Pupils identify, compare and sort shapes on the basis of their properties and use vocabulary precisely, such as sides, edges, vertices and faces. Pupils should read and write names for shapes that are appropriate for their word reading and spelling. Pupils should draw lines and shapes using a straight edge.</p>
<p>Geometry: position, direction, motion Pupils should be taught to:</p> <ul style="list-style-type: none"> • order and arrange combinations of 	<p>Geometry: position, direction, motion Pupils should work with patterns of shapes, including those in different orientations.</p>

<p>mathematical objects in patterns</p> <ul style="list-style-type: none"> • use mathematical vocabulary to describe position, direction and movement, including distinguishing between rotation as a turn and in terms of right angles for quarter, half and three-quarter turns (clockwise and anti-clockwise), and movement in a straight line. 	<p>Pupils should use the concept and language of angles to describe 'turn' by applying rotations, including in practical contexts (e.g. pupils themselves moving in turns, giving instructions to other pupils to do so, and programming robots using instructions given in right angles).</p>
<p>Data Pupils should be taught to:</p> <ul style="list-style-type: none"> • interpret and construct simple pictograms, tally charts, block diagrams and simple tables • ask and answer simple questions by counting the number of objects in each category and sorting the categories by quantity • ask and answer questions about totalling and compare categorical data. 	<p>Data At this stage, pupils' recording and interpretation become more sophisticated as they collate, organise and compare information (e.g. using many-to-one correspondence in pictograms and using simple ratios 2, 5, 10).</p>

Year 3	
Number, place value and rounding	Addition and subtraction
<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> □ count from 0 in multiples of 4, 8, 50 and 100; finding 10 or 100 more or less than a given number □ recognise the place value of each digit in a three-digit number (hundreds, tens, ones) □ compare and order numbers up to 1000 □ identify, represent and estimate numbers using different representations □ read and write numbers to at least 1000 in numerals and in words □ solve number problems and practical problems involving these ideas. 	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> □ add and subtract numbers mentally, including: <ul style="list-style-type: none"> □ a three-digit number and ones □ a three-digit number and tens □ a three-digit number and hundreds □ add and subtract numbers with up to three digits, using the efficient written methods of columnar addition and subtraction □ estimate the answer to a calculation and use inverse operations to check answers □ solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction.
Multiplication and division	Fractions
<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> □ recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables □ write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to efficient written methods □ solve problems, including missing number problems, involving multiplication and division, including integer scaling problems and correspondence problems in which n objects are connected to m objects. 	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> □ count up and down in tenths; recognise that tenths arise from dividing an object into 10 equal parts and in dividing one-digit numbers or quantities by 10 □ recognise, find and write fractions of a discrete set of objects: unit fractions and non-unit fractions with small denominators □ recognise and use fractions as numbers: unit fractions and non-unit fractions with small denominators □ recognise and show, using diagrams, equivalent fractions with small denominators □ add and subtract fractions with the same denominator within one whole (e.g. $5/7 + 1/7 = 6/7$) □ compare and order unit fractions with the same denominator □ solve problems that involve all of the above.
Measures	Geometry

<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> □ measure, compare, add and subtract: lengths (m/cm/mm); mass (kg/g); volume/capacity (l/ml) □ measure the perimeter of simple 2-D shapes □ add and subtract amounts of money to give change, using both £ and p in practical contexts □ tell and write the time from an analogue clock, including using Roman numerals from I to XII, and 12-hour and 24-hour clocks □ estimate and read time with increasing accuracy to the nearest minute; record and compare time in terms of seconds, minutes, hours and o'clock; use vocabulary such as a.m./p.m., morning, afternoon, noon and midnight □ know the number of seconds in a minute and the number of days in each month, year and leap year □ compare durations of events, for example to calculate the time taken by particular events or tasks. 	<p>Properties of shape</p> <p>Pupils should be taught to:</p> <ul style="list-style-type: none"> □ draw 2-D shapes and make 3-D shapes using modelling materials; recognise 3-D shapes in different orientations; and describe them with increasing accuracy □ recognise angles as a property of shape and associate angles with turning □ identify right angles, recognise that two right angles make a half-turn, three make three quarters of a turn and four a complete turn; identify whether angles are greater than or less than a right angle □ identify horizontal, vertical, perpendicular and parallel lines in relation to other lines.
<p>Data</p>	
<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> □ interpret and present data using bar charts, pictograms and tables □ solve one-step and two-step questions such as 'How many more?' and 'How many fewer?' using information presented in scaled bar charts and pictograms and tables. 	

Year 4	
Number, place value and rounding	Addition and subtraction
<p>Pupils should be taught to</p> <ul style="list-style-type: none"> □ count in multiples of 6, 7, 9, 25 and 1000 □ find 1000 more or less than a given number □ count backwards through zero to include negative numbers □ recognise the place value of each digit in a four-digit number (thousands, hundreds, tens, and ones) □ order and compare numbers beyond 1000 □ identify, represent and estimate numbers using different representations □ round any number to the nearest 10, 100 or 1000 □ solve number and practical problems that involve all of the above and with increasingly large positive numbers □ read Roman numerals to 100 (I to C) and understand how, over time, the numeral system changed to include the concept of zero and place value. 	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> □ add and subtract numbers with up to 4 digits using the efficient written methods of columnar addition and subtraction where appropriate □ estimate and use inverse operations to check answers to a calculation □ solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why.
Multiplication and division	Fractions
<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> □ recall multiplication and division facts for multiplication tables up to 12×12 □ use place value, known and derived facts to multiply and divide mentally, including: multiplying by 0 and 1; dividing by 1; multiplying together three numbers □ recognise and use factor pairs and commutativity in mental calculations □ multiply two-digit and three-digit numbers by a one-digit number using formal written layout □ solve problems involving multiplying and adding, including using the distributive law and harder multiplication problems such as which n objects are connected to m objects. 	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> □ count up and down in hundredths; recognise that hundredths arise when dividing an object by a hundred and dividing tenths by ten □ solve problems involving increasingly harder fractions to calculate quantities, and fractions to divide quantities, including non-unit fractions where the answer is a whole number □ identify, name and write equivalent fractions of a given fraction, including tenths and hundredths □ add and subtract fractions with the same denominator.

Decimals and fractions	Measures
<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> □ recognise and write decimal equivalents of any number of tenths or hundredths □ recognise and write decimal equivalents to $\frac{1}{4}$; $\frac{1}{2}$; $\frac{3}{4}$ □ find the effect of dividing a one- or two-digit number by 10 and 100, identifying the value of the digits in the answer as units, tenths and hundredths □ round decimals with one decimal place to the nearest whole number □ compare numbers with the same number of decimal places up to two decimal places □ solve simple measure and money problems involving fractions and decimals to two decimal places. 	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> □ convert between different units of measure (e.g. kilometre to metre; hour to minute) □ measure and calculate the perimeter of a rectilinear figure (including squares) in centimetres and metres □ find the area of rectilinear shapes by counting □ estimate, compare and calculate different measures, including money in pounds and pence □ read, write and convert time between analogue and digital 12 and 24-hour clocks □ solve problems involving converting from hours to minutes; minutes to seconds; years to months; weeks to days.
Geometry	Data
<p>Properties of shapes</p> <p>Pupils should be taught to:</p> <ul style="list-style-type: none"> □ compare and classify geometric shapes, including quadrilaterals and triangles, based on their properties and sizes □ identify acute and obtuse angles and compare and order angles up to two right angles by size □ identify lines of symmetry in 2-D shapes presented in different orientations □ complete a simple symmetric figure with respect to a specific line of symmetry. <p>Position, direction, motion</p> <p>Pupils should be taught to:</p> <ul style="list-style-type: none"> □ describe positions on a 2-D grid as coordinates in the first quadrant □ describe movements between positions as translations of a given unit to the left/right and up/down □ plot specified points and draw sides to complete a given polygon. 	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> □ interpret and present discrete data using bar charts and continuous data using line graphs □ solve comparison, sum and difference problems using information presented in bar charts, pictograms, tables and simple line graphs.

Year 5	
Number, place value, approximation and estimation	Addition and subtraction
<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> □ read, write, order and compare numbers to at least 1 000 000 and determine the value of each digit □ count forwards or backwards in steps of powers of 10 for any given number up to 1 000 000 □ interpret negative numbers in context, count forwards and backwards with positive and negative whole numbers through zero □ round any number up to 1 000 000 to the nearest 10, 100, 1000, 10 000 and 100 000 □ solve number problems and practical problems that involve all of the above □ read Roman numerals to 1000 (M) and recognise years written in Roman numerals. 	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> □ add and subtract whole numbers with more than 4 digits, including using efficient written methods (columnar addition and subtraction) □ add and subtract numbers mentally with increasingly large numbers □ use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy □ solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why.
Multiplication and division	Fractions
<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> □ identify multiples and factors, including finding all factor pairs □ solve problems involving multiplication and division where larger numbers are used by decomposing them into their factors □ know and use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers □ establish whether a number up to 100 is prime and recall prime numbers up to 19 □ multiply numbers up to 4 digits by a one- or two-digit number using an efficient written method, including long multiplication for two-digit numbers □ multiply and divide numbers mentally drawing upon known facts □ divide numbers up to 4 digits by a one-digit number using the efficient written method of short division and interpret remainders appropriately for the context □ multiply and divide whole numbers and those involving decimals by 10, 100 and 1000 □ recognise and use square numbers and cube numbers, and the notation for squared (²) and cubed (³) □ solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign □ solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates. 	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> □ compare and order fractions whose denominators are all multiples of the same number □ recognise mixed numbers and improper fractions and convert from one form to the other □ add and subtract fractions with the same denominator and related fractions; write mathematical statements >1 as a mixed number (e.g. $\frac{2}{5} + \frac{4}{5} = \frac{6}{5} = 1\frac{1}{5}$) □ multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams.

Decimals and fractions	Percentages, decimals and fractions
<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> □ read and write decimal numbers as fractions (e.g. $0.71 = 71/100$) □ recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents □ round decimals with two decimal places to the nearest whole number and to one decimal place □ read, write, order and compare numbers with up to three decimal places □ solve problems involving number up to three decimal places. 	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> □ recognise the per cent symbol (%) and understand that per cent relates to "number of parts per hundred", and write percentages as a fraction with denominator hundred, and as a decimal fraction □ solve problems which require knowing percentage and decimal equivalents of $1/2$, $1/4$, $1/5$, $2/5$, $4/5$ and those with a denominator of a multiple of 10 or 25.
Measures	Geometry: properties of shapes
<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> □ convert between different units of measure (e.g. kilometre and metre; metre and centimetre; centimetre and millimetre; kilogram and gram; litre and millilitre) □ understand and use basic equivalences between metric and common imperial units and express them in approximate terms □ measure and calculate the perimeter of composite rectilinear shapes in centimetres and metres □ calculate and compare the area of squares and rectangles including using standard units, square centimetres (cm^2) and square metres (m^2) and estimate the area of irregular shapes □ recognise and estimate volume (e.g. using 1 cm^3 blocks to build cubes and cuboids) and capacity (e.g. using water) □ solve problems involving converting between units of time □ solve problems involving addition and subtraction of units of measure (e.g. length, mass, volume, money) using decimal notation. 	<p>Properties of shapes</p> <p>Pupils should be taught to:</p> <ul style="list-style-type: none"> □ identify 3-D shapes, including cubes and cuboids, from 2-D representations □ know angles are measured in degrees; estimate and measure them and draw a given angle, writing its size in degrees (o) □ identify: <ul style="list-style-type: none"> □ multiples of 90° □ angles at a point on a straight line and $\frac{1}{2}$ a turn (total 180°) □ angles at a point and one whole turn (total 360°) □ reflex angles, and □ compare different angles □ draw shapes using given dimensions and angles □ state and use the properties of a rectangle (including squares) to deduce related facts □ distinguish between regular and irregular polygons based on reasoning about equal sides and angles. <p>Position, direction, motion</p> <p>Pupils should be taught to:</p> <ul style="list-style-type: none"> □ identify, describe and represent the position of a shape following a reflection or translation, using the appropriate language, and know that the shape has not changed.
Data	
<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> □ solve comparison, sum and difference problems using information presented in line graphs □ complete, read and interpret information in tables, including timetables. 	

Year 6	
Number, place value and rounding	Addition, subtraction, multiplication and division
<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> □ read, write, order and compare numbers up to 10 000 000 and determine the value of each digit □ round any whole number to a required degree of accuracy □ use negative numbers in context, and calculate intervals across zero □ solve number problems and practical problems that involve all of the above. 	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> □ multiply multi-digit numbers up to 4 digits by a two-digit whole number using the efficient written method of long multiplication □ divide numbers up to 4 digits by a two-digit whole number using the efficient written method of long division, and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context □ perform mental calculations, including with mixed operations and large numbers □ identify common factors, common multiples and prime numbers □ use their knowledge of the order of operations to carry out calculations involving the four operations □ solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why □ solve problems involving addition, subtraction, multiplication and division □ use estimation to check answers to calculations and determine, in the context of a problem, levels of accuracy.
Fractions	Decimals and fractions
<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> □ use common factors to simplify fractions; use common multiples to express fractions in the same denomination □ compare and order fractions, including fractions >1 □ associate a fraction with division to calculate decimal fraction equivalents (e.g. 0.375) for a simple fraction (e.g. $\frac{3}{8}$) □ add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions □ multiply simple pairs of proper fractions, writing the answer in its simplest form (e.g. $\frac{1}{4} \times \frac{1}{2} = \frac{1}{8}$) □ divide proper fractions by whole numbers (e.g. $\frac{1}{3} \div 2 = \frac{1}{6}$). 	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> □ identify the value of each digit to three decimal places and multiply and divide numbers by 10, 100 and 1000 where the answers are up to three decimal places □ multiply one-digit numbers with up to two decimal places by whole numbers □ use written division methods in cases where the answer has up to two decimal places □ solve problems which require answers to be rounded to specified degrees of accuracy.

Percentages, decimals and fractions	Ratio and proportion
<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> □ solve problems involving the calculation of percentages of whole numbers or measures such as 15% of 360 and the use of percentages for comparison □ recall and use equivalences between simple fractions, decimals and percentages, including in different contexts. 	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> □ solve problems involving the relative sizes of two quantities, including similarity □ solve problems involving unequal sharing and grouping.
Algebra	Measures
<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> □ express missing number problems algebraically □ use simple formulae expressed in words □ generate and describe linear number sequences □ find pairs of numbers that satisfy number sentences involving two unknowns. 	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> □ solve problems involving the calculation and conversion of units of measure, using decimal notation to three decimal places where appropriate □ use, read, write and convert between standard units, converting measurements of length, mass, volume and time from a smaller unit of measure to a larger unit, and vice versa, using decimal notation to three decimal places □ convert between miles and kilometres □ recognise that shapes with the same areas can have different perimeters and vice versa □ calculate the area of parallelograms and triangles □ recognise when it is necessary to use the formulae for area and volume of shapes □ calculate, estimate and compare volume of cubes and cuboids using standard units, including centimetre cubed (cm^3) and cubic metres (m^3) and extending to other units, such as mm^3 and km^3.

Geometry	Data
<p>Properties of shape Pupils should be taught to:</p> <ul style="list-style-type: none"> □ recognise, describe and build simple 3-D shapes, including making nets □ compare and classify geometric shapes based on their properties and sizes and find unknown angles in any triangles, quadrilaterals, and regular polygons □ illustrate and name parts of circles, including radius, diameter and circumference □ find unknown angles where they meet at a point, are on a straight line, and are vertically opposite. <p>Position, direction and motion Pupils should be taught to:</p> <ul style="list-style-type: none"> □ describe positions on the full coordinate grid (all four quadrants) □ draw and translate simple shapes on the coordinate plane, and reflect them in the axes. 	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> □ interpret and construct pie charts and line graphs and use these to solve problems □ calculate and interpret the mean as an average.